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Evaluation of knowledge and attitudes of pregnant women about infant oral health and their oral hygiene

Pregnant women and infant oral health

Aycan Dal Dönertaş[1], Çağdaş Çınar[2]
[1] Department of Pediatric Dentistry, Faculty of Dentistry, Nigde Omer Halisdemir University, Niğde
[2] Department of Pediatric Dentistry, Faculty of Dentistry, Gazi University, Ankara, Turkey

Abstract
Aim: The aim of this study was to investigate the necessary oral hygiene practices and knowledge level of pregnant women both for themselves and their children.
Material and Methods: Five hundred fifty-five pregnant mothers and mothers with children under 12 months who applied to Gazi University Faculty of Medicine, Pediatrics, Obstetrics and Gynecology Clinics, were surveyed. The first part of the questionnaire consisted of the socio-demographic data of the mothers, the second part consisted of oral health questions related to the mother during the pregnancy period, and the third part consisted of oral health questions about the baby. The data obtained from the survey results were analyzed using IBM SPSS Statistics 17.0 (IBM Corporation, Armonk, NY, USA).
Results: 68.8% of the participants stated that auxiliary dental hygiene devices should be used to provide oral hygiene; 68.1% of the participants thought that there was a relationship between periodontal diseases and pregnancy outcomes. 62% of women reported they should go to the dentist for a dental consultation during pregnancy; 44.7% of the participants reported the baby's teeth should be brushed after the first tooth eruption, and the majority (64.7%) thought they should be brushed 2 times a day.
Discussion: Our findings are in line with previous reports. Income level was significantly associated with increased use of auxiliary dental hygiene devices and the knowledge that pregnancy could lead to gum problems ($p<0,001$). Educational level was significantly associated with knowledge about the need for dental consultation, the importance of baby's general and oral health during pregnancy, and also the knowledge about vertical transition. The time and frequency of tooth brushing did not show a statistically significant difference when the number of pregnancies was examined ($p>0,05$). However, postgraduate mothers had a significantly higher difference ($p<0,001$).

Keywords
Infant, Knowledge, Oral Health, Pregnancy, Attitudes

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Corresponding Author: Aycan Dal Dönertaş, Department of Pediatric Dentistry, Faculty of Dentistry, Nigde Omer Halisdemir University, 51240, Merkez, Niğde, Turkey.
E-mail: aycandal@outlook.com P: +90 537 723 40 89
Corresponding Author ORCID ID: https://orcid.org/0000-0002-5876-4586

Introduction

Perinatal oral health is a crucial component of obstetric practice, with significant impacts on maternal, fetal, and infant health. Perinatal period is the period starting from 20th-28th weeks of pregnancy and including the first 1-4 weeks after the birth. Infantile period is defined as the time until 12 months of age [1]. Current data suggest that patients with poor oral health, in addition to the progressive deterioration in their own dental diseases, have an increased risk of miscarriage, premature birth, and fetal growth restriction [1].

At first glance, infant and oral health may not appear to be closely related. Ultimately, most babies are born without teeth and usually spend the first half of the infantile without teeth. Even so, oral health is also a concerned in infancy, because infantile period is a critical time to acquire both good and bad habits that have the potential to affect the general health of the individual as well as the future oral health of adolescents and their adulthood [2].

In this study, we aimed to evaluate the knowledge level of mothers about oral hygiene practices for themselves and their babies.

Material and Methods

Participants in the present study were pregnant women or women with children under 12 months of age who applied to Gazi University Faculty of Medicine, Obstetrics and Gynecology Clinics, in the capital of Turkey. As a result of power analysis, the minimum number of people was determined. A self-designed 29-question survey was conducted to measure oral care knowledge levels for pregnant mothers and mothers with children under 12 months of age. A total of 441 pregnant women and 114 recent mothers were interviewed, and a total of 555 interviews were conducted. The study was approved by Gazi University Faculty of Dentistry Research Ethics committee on 06/02/2018 and was conducted in full accordance with the World Medical Association Declaration of Helsinki. Since the questionnaire was self-designed, content validity was established by a panel of experts at Gazi University Faculty of Dentistry. After verbal consent, the survey was carried out by one person and done face to face.

Items in the questionnaire included demographics, oral hygiene knowledge, practice during pregnancy, and oral hygiene knowledge and practice for infant.

Data were statistically analyzed using IBM SPSS Statistics 17.0 (IBM Corporation, Armonk, NY, USA). The Kolmogorov-Smirnov test was used to determine whether the distribution of continuous and discrete numerical variables was close to normal. The assumption of homogeneity of variances was investigated using Levene's test. Descriptive statistics; mean ± standard deviation was used for continuous and discrete numerical variables, number of cases, and percentages (%) for categorical variables. In the case of 2x2 cross tables, if the expected frequency is less than five, in at least one of the cells, the categorical data were evaluated using Fisher's Final Probability Test. Continuous Corrected Chi-Square test was used to test the expected frequency between 5-25. Otherwise, Pearson's chi-square test was used.

Results

According to socio-demographic data, the results indicated that the majority of 36.9% were between the 30-34 age years old, 34.2% were <30 years old, and 28,8% were ≥35 years old. According to the educational level of the participants, nearly half of the participants with 45.9% had a university degree, while 11.2% had less than a high school education; 21.8% were at the high school level and 21.1% were at the postgraduate level. In terms of economic status, the majority of volunteers (38.2%) earned as a total family income by month >6000 Turkish Liras (TL); and only 11.2% earned <2000 TL monthly. In terms of pregnancy, the majority of the participants (79.4%) were pregnant mothers who had not given birth yet. It was observed that more than half of the participants (53.5%) had their first pregnancy, and 14.6% had more than two pregnancies.

Null hypothesis 1: Participants with high income would report less use of auxiliary dental hygiene devices than participants with less income. About 82.1% of participants with high income stated that auxiliary dental hygiene devices should be used during pregnancy (p<0,001) than participants with less income (Table 1). The analysis revealed a statistically significant relationship between income and the use of auxiliary dental hygiene devices during pregnancy. Therefore, null hypothesis 1 was rejected.

Null hypothesis 2: Participants with high income would report less knowledge about the relationship between pregnancy and periodontal diseases than participants with less income. This null hypothesis was rejected, as Pearson's Chi-square analysis showed a statistically significant relationship between family income and knowledge about the relationship between pregnancy and periodontal diseases (p<0,001). About 79.2% of participants with high income showed knowledge about the existence of a possible relationship between pregnancy and periodontal diseases (Table 1).

Null hypothesis 3: Participants with high income would report fewer dental visits during pregnancy than participants with less income. About 69.8% of participants with high income reported that visiting a dentist during pregnancy was necessary (p<0,001) than participants with less income (Table 1). The analysis revealed a statistically significant relationship between income and visiting a dentist during pregnancy. Thus, null hypothesis 3 was rejected.

Null hypothesis 4: Highly educated mothers and pregnant women would report less knowledge about the relationship between pregnancy and a baby's general and oral health than less educated mothers and pregnant women. This null hypothesis was rejected as Pearson's Chi-square analysis showed a statistically significant relationship between educational level and knowledge about the relationship between pregnancy and a baby's general and oral health. About 68.4% of postgraduate mothers and pregnant women pointed out that oral health of the mother is important during pregnancy for baby's general health (p=0,009). Also, 70.1% of postgraduate mothers and pregnant women stated that mother's feeding during pregnancy affects the health of the baby's teeth (p=0,015) (Table 2).

Null hypothesis 5: As the number of pregnancies is increases, women would report less knowledge about when and how

often a baby's teeth should be brushed than women who have fewer number of pregnancies. The participants were asked the questions ''When to start brushing the baby's teeth ?'' and ''How often should the baby's teeth be brushed?'' and Pearson's Chi-square analysis revealed no statistically significant relationship between the number of pregnancies and the knowledge about brushing time and frequency (p>0,05) (Table 3). Therefore, the above null hypothesis was accepted.

Null hypothesis 6: Highly educated mothers and pregnant women would report less knowledge about vertical transition of caries than less educated mothers and pregnant women. This null hypothesis was rejected, as Pearson's Chi-square analysis showed a statistically significant relationship between educational level and knowledge about vertical transition of caries. About 58.1% of postgraduate mothers and pregnant women predicated that dental caries can be caused from the

Table .1 Total family income per month (TL)

	<2000TL	2000-4000TL	4001-6000TL	>6000TL	p-value †
Should any auxiliary dental hygiene devices be used except toothbrush and toothpaste?					
Yes	25 (%40,3)[a,d,e]	87 (%60,8)[c,d]	96 (%69,6)e,f	174 (%82,1)[a,c,f]	<0,001
No	25 (%40,3)[a,d,e]	36 (%25,2)[c,d]	26 (%18,8)e,f	22 (%10,4)[a,c,f]	<0,001
Don't know	12 (%19,4)[a]	20 (%14,0)	16 (%11,6)	16 (%7,5)[a]	0,049
Is there any relationship between periodontal diseases and pregnancy outcomes?					
Yes	37 (%59,7)[a]	90 (%62,9)[c]	83 (%60,1)[f]	168 (%79,2)[a,c,f]	<0,001
No	5 (%8,1)	19 (%13,3)	20 (%14,5)	14 (%6,6)	0,061
Don't know	20 (%32,3)[a]	34 (%23,8)[c]	35 (%25,4)[f]	30 (%14,2)[a,c,f]	0,005
Is it necessary to go to the dentist during pregnancy?					
Yes	32 (%51,6)[a]	73 (%51,0)[b,c]	91 (%65,9)[b]	148 (%69,8)[a,c]	<0,001
No	12 (%19,4)	24 (%16,8)	20 (%14,5)	19 (%9,0)	0,072
Don't know	18 (%29,0)	46 (%32,2)[b,c]	27 (%19,6)[b]	45 (%21,2)[c]	0,041

Table 2. Educational level

	<High school	High school	University	Postgraduate	p-value †
Is the oral health of the mother important during the pregnancy for the general health of the baby?					
Yes	40 (%64,5)	72 (%59,5)	130 (%51,0)[c]	80 (%68,4)[c]	0,009
No	7 (%11,3)	5 (%4,1)[d]	38 (%14,9)[d]	9 (%7,7)	0,01
Don't know	15 (%24,2)	44 (%36,4)	87 (%34,1)	28 (%23,9)	0,079
Does the feeding of the mother affect the health of the baby's teeth during pregnancy?					
Yes	34 (%54,8)	74 (%61,2)	135 (%52,9)[c]	82 (%70,1)[c]	0,015
No	7 (%11,3)	11 (%9,1)	36 (%14,1)[c]	5 (%4,3)[c]	0,036
Don't know	21 (%33,9)	36 (%29,8)	84 (%32,9)	30 (%25,6)	0,504
Can dental caries be caused by bacteria transmitted from mother to child by kissing the baby on the mouth?					
Yes	25 (%40,3)[b]	45 (%37,2)[d]	120 (%47,1)[e]	68 (%58,1)[b,d,e]	0,009
No	17 (%27,4)	35 (%28,9)	60 (%23,5)	25 (%21,4)	0,513
Don't know	20 (%32,3)	41 (%33,9)	75 (%29,4)	24 (%20,5)	0,119
Can dental caries be caused by bacteria transmitted from the mother to the child by controlling the food in the spoon with the mother's mouth during the feeding of the baby?					
Yes	30 (%48,4)[b]	54 (%44,6)[d]	135 (%52,9)[e]	76 (%65,0)[b,d,e]	0,014
No	18 (%29,0)	19 (%15,7)	47 (%18,4)	19 (%16,2)	0,134
Don't know	14 (%22,6)[f]	48 (%39,7)[c,d,f]	73 (%28,6)[c,e]	22 (%18,8)[d,e]	0,003

Table 3. Number of pregnancies

	First	Second	More	p-value †
When to start brushing the baby's teeth?				
After the first primer tooth eruption	132 (%44,4)	86 (%48,6)	30 (%37,0)	0,222
After all primer teeth eruption	118 (%39,7)	74 (%41,8)	42 (%51,9)	0,146
After the first permanent teeth eruption	34 (%11,4)	15 (%8,5)	9 (%11,1)	0,579
How often should the baby's teeth be brushed?				
Once a day	84 (%28,3)	50 (%28,2)	28 (%34,6)	0,515
Twice a day	198 (%66,7)	111 (%62,7)	50 (%61,7)	0,571
More than twice a day	15 (%5,1)	16 (%9,0)	3 (%3,7)	0,133

mother to the child by kissing the baby on the mouth (p=0,009), and 65% of them indicated that dental caries can be caused from the mother to the child by controlling the food in the spoon with the mother's mouth during the feeding of the baby (p=0,014) (Table 2).

Discussion

Due to the lack of studies on the knowledge of oral hygiene among Turkish women during pregnancy and infant oral health information, a study investigating the knowledge of mothers on these subjects was deemed appropriate. The power analysis required a minimum of 480 participants, and we gave questionairre to 555 women within one year. As the assessment of knowledge during pregnancy in the present study was based on self-reports, the validity of the results might be questioned.

General advice to patients from oral health professionals worldwide is that they usually need to brush their teeth twice a day with excipients such as fluoride toothpaste at the appropriate concentration. Regular toothbrushing twice a day with fluoride toothpaste is widely recommended for all age groups [3,4]. In a study conducted by Chung et al. [5] on pregnant women, 88% of mothers reported brushing at least twice a day, and 42% reported using dental floss at least once a day. Low income was associated with more poor oral hygiene outcomes. In addition, Malkawi et al. [6] reported that 62.4% of pregnant mothers regularly brushed their teeth, but 73.2% did not use auxiliary oral hygiene products such as floss or mouthwash. In the study of Ozen et al. [7], it is reported that 57% of pregnant women brushed their teeth more than once a day, and 93% of them brushed once a day. They also reported that 8% of pregnant women used dental floss, and 3% had mouth rinse water.

Our findings are in line with these previous reports; 67.4% the of participants stated that teeth should be brushed twice a day, while 13.5% of them indicated that they should be brushed once a day. When asked about the use of auxiliary hygiene products such as floss and mouthwash, 68.8% of the participants answered 'yes', 19.6% of them answered 'no'. At income level >6000 TL, the ratio of 'yes' response compared to other income levels was statistically significant and higher (p<0,001).

In the second and third trimesters of pregnancy, pregnancy-associated gingivitis is observed by an increased prevalence and severity of the disease. Although the number of plaques is relatively low during pregnancy, the main symptoms of gingival inflammation tend to occur [8]. With proper oral hygiene during pregnancy, plaque cleaning and oral care can minimize gingival inflammation [9]. In the study conducted by Gonik et al. [10], 61% of those who went to the state hospital and 72% of pregnant women who went to a private center agreed that pregnancy could cause worsening gingival health. Ozen et al. [7] reported that among pregnant Turkish women, 68.7% stated that they experienced oral health problems during pregnancy and that pregnancy could cause gingival problems.

In the present study, very similar findings with these studies were found, and 68.1% of the women who participated in our survey stated that pregnancy caused gingival problems. Women with high-income level knew that pregnancy could lead to gum problems. The results were found to be significantly higher than those with low income (p<0,001).

Women who do not visit a dentist during pregnancy may pretend like they do not have oral health problems, or have excuses including that they have insufficient time, that dental treatment may harm the fetus or that they fear dental services [11-13]. In a cohort study conducted in London, 35% of mothers did not receive oral health advice during pregnancy [14]. In the study conducted among pregnant women in the north of Jordan, 68.2% of the respondents knew that they needed dental consultation during pregnancy, but only 39.5% received dental consultation during pregnancy. A statistically significant relationship was found between the level of education and knowledge about the need for dental consultation during pregnancy [6].

The present study also confirmed these studies; 62% of participants indicated that it is necessary to go to the dentist during pregnancy. The ratio of mothers reporting the needed to go to the dentist during pregnancy was found to be statistically significant both in terms of education levels and income level (p<0,001).

Ozen et al. [7] reported that 75% of pregnant women stated a relationship between pregnancy and oral health. However, only 47% of women reported that oral and dental health problems might affect pregnancy outcomes [7]. In a similar study conducted by Gonik et al. [10], only 7% of pregnant women stated that poor oral hygiene status could lead to miscarriages, and only 12% of pregnant women had knowledge about the correlation between poor oral hygiene and early birth. Studies have shown that reducing maternal oral levels of Streptococcus mutans, the bacteria responsible for caries, reduces vertical transfer to the newborn and lowers the risk of tooth decay. As an important finding, these studies have shown that mothers do not know that bacterial colonization occurs before the child's first teeth eruption [10,15,16].

Conversely, the present study found a better result than the findings of these studies; 58% of the participants reported that the health of the mother during pregnancy was important for the general health of the baby, and the results showed a statistically significant difference between the educational level of the participants (p=0,009). In addition, more than half of our participants (58.6%) stated that the nutrition of the mother during pregnancy will affect the health of the baby's teeth and again results showed a statistically significant difference when the educational level was examined (p=0,015).

Correia et al. [14] reported that 26.1% of mothers stated they did not think about the time to brush their baby's teeth and 7.8% indicated they were not sure; 49.6% of mothers planned to start brushing their baby's teeth as soon as the first tooth emerged; 11.3% of them planned to do so when the baby started eating solid foods.

Similar results were found in the present study; 44.7% of the participants stated that tooth brushing should start when the first tooth erupted, and 42.2% indicated it was appropriate to brush after all the primary teeth have erupted. The time and frequency of tooth brushing did not show a statistically significant difference when the number of pregnancies was examined (p>0,05). However, postgraduate mothers have a significantly higher difference (p<0,001).

The similarity of S. mutans genotype between mother and

child varies between cultures. In American society, S. mutans similarity between mother and child was found to be 71% [17], in Japan 70% [18], in Brazil 81% [19], whereas in Chinese society, this rate was found to be 45% [17]. In Turkish society, S. mutans between mother and child were reported as 24% [20]. In the study by Gonik et al. [10], the ratio of mothers who reported that kissing from the baby's mouth may be related to S.mutans transition and may lead to childhood caries were 12% in the state hospital and 7% in a private center. Regarding sharing the spoon with baby, 16% of mothers in the state hospital and 22% of mothers in the private center thought that this behavior could cause decay transition.

In the present study, compared to the findings of other studies, the percentage of correct answers was found to be much higher; 46.5% of the participants reported that tooth decay can be transmitted from mother to child by kissing the baby; 53.2% stated that during common spoon use, there may be bacterial transmission from mother to child, and this may cause caries formation. Mothers with postgraduate degrees were more likely to answer correctly to the question about the kissing of the baby (p=0,009) and the question about the use of the same spoon as the baby (p=0,014).

Conclusions

Mothers' knowledge and practices help to create more effective strategies to benefit babies. More studies are needed to identify pregnant mothers at a high risk for caries and to improve effective oral health for both themselves and their babies. It is important to better educate women who are pregnant or have a newborn about oral and dental health.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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References

1. American College of Obstetricians and Gynecologists Women's Health Care Physicians; Committee on Health Care for Under-served Women. Committee Opinion No. 569: Oral health care during pregnancy and through the lifespan. Obstet Gynecol. 2013;122(2 Pt 1):417-22.

2. Brecher EA, Lewis CW. Infant Oral Health. Pediatr Clin North Am. 2018;65(5):909-21.

3. Dye BA, Tan S, Smith V, Lewis BG, Barker LK, Thornton-Evans G, et al. Trends in oral health status: United States, 1988-1994 and 1999-2004. Vital Health Stat. 2007;248:1-92.

4. dos Santos AP, Nadanovsky P, de Oliveira BH. A systematic review and meta-analysis of the effects of fluoride toothpastes on the prevention of dental caries in the primary dentition of preschool children. Comm Dent Oral Epidemiol. 2013;41(1):1-12.

5. Chung, LH, Gregorich SE, Armitage GC, Gonzalez-Vargas J, Adams SH. Sociodemographic disparities and behavioral factors in clinical oral health status during pregnancy. Comm Dent Oral Epidemiol. 2014;42(2):151-9.

6. Malkawi ZA, Tubaishat RS. Knowledge, practice and utilization of dental services among pregnant women in the north of Jordan. J Contemp Dent Pract. 2014;15(3):345-51.

7. Ozen B, Ozer L, Basak F, Altun C, Acikel C. Turkish women's self-reported knowledge and behavior towards oral health during pregnancy. Med Princ Pract. 2012;21(4):318-22.

8. Mariotti A. Plaque-related gum diseases. In Lindhe J, Lang NP, editors. Clinical Periodontology and Implant Dentistry. Copenhagen: Wiley-Blackwell; 2015;6:366-80.

9. Christensen LB, Jeppe-Jensen D, Petersen PE. Self-reported gingival conditions and self-care in the oral health of Danish women during pregnancy. J Clin Periodontol. 2003;30(11):949-53.

10. Gonik B, Wilson E, Mayberry M, Joarder BY. Pregnant Patient Knowledge and Behavior Regarding Perinatal Oral Health. Am J Perinat. 2017;34(7):663-7.

11. Gaffield ML, Gilbert BJ, Malvitz DM, Romaguera R. Oral health during pregnancy: an analysis of information collected by the pregnancy risk assessment monitoring system. J Am Dent Assoc. 2001;132(7):1009-16.

12. Al Habashneh R, Guthmiller JM, Levy S, Johnson GK, Squier C, Dawson DV, et al. Factors related to utilization of dental services during pregnancy. J Clin Periodontol. 2005;32(7):815-21.

13. Saddki N, Yusoff A, Hwang YL. Factors associated with dental visit and barriers to utilisation of oral health care services in a sample of antenatal mothers in Hospital University Sains Malaysia. BMC Public Health. 2010;10(75):562-8.

14. Correia PN, Alkhatrash A, Williams CE, Briley A, Carter J, Poston L, et al. What do expectant mothers need to know about oral health? A cohort study from a London maternity unit. BDJ Open. 2017;3:17004.

15. da Silva Bastos Vde A, Freitas-Fernandes LB, Fidalgo TK, Martins C, Mattos CT, de Souza IP, et al. Mother-to-child transmission of Streptococcus mutans: a systematic review and meta-analysis. J Dent. 2015;43(2):181-91.

16. Binks C, Duane B. Mother-to-child transmission of Streptococcus mutans. J Evid Based Dent Pract. 2015;16(2):39-40.

17. Li Y, Wang W, Caufield PW. The fidelity of mutans streptococci transmission and caries status correlate with breast-feeding experience among Chinese families. Caries Res. 2000;34(2):123-32.

18. Lapirattanakul J, Nakano K, Nomura R, Hamada S, Nakagawa I, Ooshima T. Demonstration of mother-to-child transmission of Streptococcus mutans using multilocus sequence typing. Caries Res. 2008;42(6):466-74.

19. Klein MI, Florio FM, Pereira AC, Hofling JF, Goncalves RB. Longitudinal study of transmission, diversity, and stability of Streptococcus mutans and Streptococcus sobrinus genotypes in Brazilian nursery children. J Clin Microbiol. 2004;42(10):4620-6.

20. Hames-Kocabas EE, Ucar F, Kocatas Ersin N, Uzel A, Alpoz AR. Colonization and vertical transmission of Streptococcus mutans in Turkish children. Microbiol Res. 2008;163(2):168-72.

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